Environment and Development Economics 6 (2001): 415–417

Summaries

Transgenic crops and the environment: missing markets and public roles

SANDRA S. BATIE AND DAVID E. ERVIN

Agricultural biotechnology has been described as a tsunami washing over agriculture – with fundamental impacts on how we grow and market our food and fiber. While some argue the current transgenic crop innovations are just the next step in a long history of plant and animal breeding, others strongly disagree. Modern biotechnology involves genetic manipulations of transferring DNA from one organism to another. For many, these unique attributes of transgenic crops are cause for concern.

One major concern is the impact of the adoption of transgenic crops on the environment. These environmental concerns can be explored within the framework of three themes. First, because the current transgenic crop technology is shaped by private firms and is not induced by growing scarcity in key natural resource inputs, and not pulled along by robust consumer markets, there is a particular need for careful public scrutiny. These missing forces may mean that the social decision calculus for transgenic crops is not well informed by the full range and distribution of benefits and costs.

The second theme is that missing markets for environmental and other attributes, as well as incomplete regulatory frameworks, may hinder transgenic crop biotechnology from reaching its potential for social good. Important social costs and benefits are not reflected in the prices of inputs or outputs.

The third theme explores whether transgenic crops are necessary for the production of wildlife habitat and wilderness, and to feed the world's population. While some claim that such crops are the answer to both food security and a healthy planet, others demur.

While the potential for environmental benefits from transgenic crops is real, it is yet unrealized. However, agricultural biotechnology is still in its infancy, as are the regulatory frameworks that guide and influence it. The authors explore the issues and linkages that associate transgenic crops with the environment. They suggest that a cautious approach to approving and diffusing biotechnologies is prudent, and conclude with specific recommendations for a broader public role.

Pesticide use in Brazil in the era of agroindustrialization and globalization

SUSMITA DASGUPTA, NLANDU MAMINGI, AND CRAIG MEISNER

Although most environmentalists expect profound change in pesticide use (and associated human health hazards and environmental degradation) to be brought about by agricultural trade liberalization in developing countries, empirical evidence on this subject is thin. A dearth of reliable data on pesticide use in developing countries has prevented systematic research in this area. In this paper, we have analyzed pesticide use in Brazil in the 1990s, a decade characterized by trade liberalization.

Drawing on a wide range of data, we find that growth in Brazil's agricultural trade in the era of trade liberalization has been associated with increased pesticide use and has also been clouded by serious human health and environmental damage caused by pesticides. Indeed, use of pesticides has more than doubled in the past decade. Moreover, examples of human pesticide poisonings and environmental damage from pesticides abound.

Our cross-section estimation results suggest widespread pesticide use in the major agricultural regions in the Center South of Brazil. In particular, we have found higher incidence of pesticide use in municipalities with high income, higher levels of education, large-size farms and with a high prevalence of sharecropping. To the extent that cross-section results can be extrapolated to time series, our results indicate that the continuation of current rends towards commercialization, industrialization and globalization of agriculture, consolidation of land holdings, and movement from family farming will further encourage pesticide use in Brazil.

In spite of that, the main message of our study is a hopeful one. Our results suggest that pesticide use in Brazil is heavily skewed towards a few cash crops for export: soybeans, sugarcane, cotton, fruits, and tobacco. This finding strongly suggests interventions targeted on a few crops may offer a promising strategy to offset the rapid increase in pesticide use.

Environmental consequences of agricultural commercialization in Asia

PRABHU L. PINGALI

Along with the rising trends in agro-industrialization, several Asian countries have witnessed a rapid transformation of their agricultural systems, from subsistence to commercial production systems. Increased commer-

https://doi.org/10.1017/S1355770X01000237 Published online by Cambridge University Press

cialization shifts farm households away from traditional self-sufficiency goals and towards profit- and income-oriented decision making; farm output is accordingly more responsive to market needs. On the demand side, the process of agricultural commercialization is triggered by rapid income growth and the consequent diversification in food demand patterns. The need to provision the rapidly growing cities of Asia also acts as a trigger for the transformation of food production systems. On the supply side, rising opportunity costs of family labor lead to declining returns to labor-intensive subsistence production systems. The process of structural transformation is well underway across much of Asia, although the speed at which it is occurring varies by country.

The commercial transformation of Asian agricultural systems can be expected to have significant impacts on the environment, both negative and positive. This paper examines a case each for the negative and positive environmental impacts of agricultural commercialization, the use of agrochemicals and water, respectively. Commercial agriculture is widely anticipated to increase the environmental and health risks associated with agro-chemical use, especially with the diversification away from cereal monoculture systems to vegetables, fruit and other high-value crops. Insecticide and fungicide use is anticipated to grow in high-value crop production as farmers' respond to increasing consumer demand and the price premium for unblemished physical appearance. In the case of cereal crops, however, recent technological advances in improving the plants' ability to resist or tolerate insect and disease pressures have resulted in a trend towards declining use of insecticides and fungicides. On the other hand, herbicide use continues to increase for cereal as well as high-value horticultural crops due to the high and increasing cost of hand weeding, in response to rising trends in real wages rates.

Globalization and commercialization could also have significant benefits in terms of improving the sustainable use of irrigated water resources. Global integration of food markets and the consequent rationalization of domestic cereal crop policies improve the profitability of crops that are less water intensive than rice. The movement away from intensive cereal monoculture systems could lead to a reduced incidence of water-induced degradation problems, such as salinity build up. Moreover, the eventual removal or substantial reduction in electricity subsidy for tube well use could lead to efficiency gains in ground water use and thereby contribute to the reversal in the declining trends in ground water levels. The extent to which positive environmental effects manifest themselves depends on both macro and micro economic policy reforms. The gradual dismantling of input subsidies and output support programs could provide direct benefits to the sustainable management of the agricultural resource base. It would be inappropriate to make a categorical and universal judgment on the impact of agricultural commercialization on the environment, the net effect could vary on a case-by-case basis.